

## CLAIMS

1 1. A magnetic head including a spin valve sensor comprising:  
2 a magnetic shield layer (S1) being fabricated above a substrate base;  
3 a first electrical insulation layer (G1) being fabricated above said S1 layer;  
4 a spin valve sensor structure being disposed above said G1 layer;  
5 wherein said spin valve sensor structure includes a seed layer being fabricated above said  
6 G1 layer, a PtMn layer being disposed above said seed layer and at least one pinned magnetic  
7 layer and at least one free magnetic layer being disposed above said PtMn layer; and  
8 wherein said seed layer includes an Al<sub>2</sub>O<sub>3</sub> sublayer, an NiMnO sublayer, and an Si  
9 sublayer.

1 2. A magnetic head as described in claim 1 wherein said Si seed sublayer is fabricated to  
2 have a thickness of approximately 10 to 40 Å.

1 3. A magnetic head as described in claim 1 wherein said Si seed sublayer is fabricated to  
2 have a thickness of approximately 20 Å.

1 4. A magnetic head as described in claim 2 wherein said PtMn layer has a thickness of  
2 approximately 120 Å.

1 5. A magnetic head as described in claim 1 wherein said Si seed sublayer is fabricated to  
2 have a thickness of approximately 20 Å and said PtMn layer has a thickness of approximately  
3 120 Å.

1 6. A magnetic head as described in claim 5 wherein said spin valve sensor layers include at  
2 least one pinned magnetic layer having a composition including CoFe and at least one spacer  
3 layer having a composition including Cu, and at least one free magnetic layer having a  
4 composition including Co or CoFe.

1 7. A magnetic head as described in claim 1 wherein said Si sublayer has an etched upper  
2 surface.

1 8. A magnetic head including a spin valve sensor comprising:  
2 a magnetic shield layer (S1) being fabricated above a substrate base;  
3 a first electrical insulation layer (G1) being fabricated above said S1 layer;  
4 a spin valve sensor structure being disposed above said G1 layer;  
5 wherein said spin valve sensor structure includes a seed layer being fabricated above said  
6 G1 layer, a PtMn layer being disposed above said seed layer and at least one pinned magnetic  
7 layer and at least one free magnetic layer being disposed above said PtMn layer; and  
8 wherein said seed layer has an upper surface comprised of Si having an etched surface  
9 structure.

1 9. A magnetic head as described in claim 8, wherein said seed layer includes seed sublayers  
2 including Al<sub>2</sub>O<sub>3</sub>, NiMnO and Si.

1 10. A magnetic head as described in claim 9 wherein said Si seed sublayer is fabricated to  
2 have a thickness of approximately 10 to 40 Å.

1 11. A magnetic head as described in claim 9 wherein said Si seed sublayer is fabricated to  
2 have a thickness of approximately 20 Å.

1 12. A magnetic head as described in claim 8 wherein said PtMn layer has a thickness of  
2 approximately 120 Å.

1 13. A magnetic head as described in claim 8 wherein said Si seed sublayer is fabricated to  
2 have a thickness of approximately 20 Å and said PtMn layer has a thickness of approximately  
3 120 Å.

1 14. A magnetic head as described in claim 13 wherein said spin valve sensor layers include at  
2 least one pinned magnetic layer having a composition including CoFe and at least one spacer  
3 layer having a composition including Cu, and at least one free magnetic layer having a  
4 composition including Co or CoFe.

1 15. A hard disk drive, including at least one magnetic head having a read head portion  
2 comprising:

3 a magnetic shield layer (S1) being fabricated above a substrate base;  
4 a first electrical insulation layer (G1) being fabricated above said S1 layer;  
5 a spin valve sensor structure being disposed above said G1 layer;  
6 wherein said spin valve sensor structure includes a seed layer being fabricated above said  
7 G1 layer, a PtMn layer being fabricated above said seed layer and at least one pinned magnetic  
8 layer and at least one free magnetic layer; and

9       wherein said seed layer includes an Al<sub>2</sub>O<sub>3</sub> sublayer, an NiMnO sublayer and an Si  
10      sublayer.

1       16.    A hard disk drive as described in claim 15 wherein said Si seed sublayer is fabricated to  
2      have a thickness of approximately 10 to 40 Å.

1       17.    A hard disk drive as described in claim 15 wherein said Si seed sublayer is fabricated to  
2      have a thickness of approximately 20 Å.

1       18.    A hard disk drive as described in claim 16 wherein said PtMn layer has a thickness of  
2      approximately 120 Å.

1       19.    A hard disk drive as described in claim 15 wherein said Si seed sublayer is fabricated to  
2      have a thickness of approximately 20 Å and said PtMn layer has a thickness of approximately  
3      120 Å.

1       20.    A hard disk drive as described in claim 19 wherein said spin valve sensor layers include  
2      at least one pinned magnetic layer having a composition including CoFe and at least one spacer  
3      layer having a composition including Cu, and at least one free magnetic layer having a  
4      composition including Co or CoFe.

1       21.    A hard disk drive as described in claim 15 wherein said Si sublayer has an etched upper  
2      surface.

1 22. A hard disk drive, including at least one magnetic head having a read head portion  
2 comprising:

3 a magnetic shield layer (S1) being fabricated above a substrate base;  
4 a first electrical insulation layer (G1) being fabricated above said S1 layer;  
5 a spin valve sensor structure being disposed above said G1 layer;  
6 wherein said spin valve sensor structure includes a seed layer being fabricated above said  
7 G1 layer, a PtMn layer being fabricated above said seed layer and at least one pinned magnetic  
8 layer and at least one free magnetic layer; and

9 wherein said seed layer has an upper surface comprised of Si having an etched surface  
10 structure.

1 23. A hard disk drive as described in claim 22, wherein said seed layer includes seed  
2 sublayers including  $\text{Al}_2\text{O}_3$ ,  $\text{NiMnO}$  and  $\text{Si}$ .

1 24. A hard disk drive as described in claim 23 wherein said  $\text{Si}$  seed sublayer is fabricated to  
2 have a thickness of approximately 10 to 40  $\text{\AA}$ .

1 25. A hard disk drive as described in claim 23 wherein said  $\text{Si}$  seed sublayer is fabricated to  
2 have a thickness of approximately 20  $\text{\AA}$ .

1 26. A hard disk drive as described in claim 24 wherein said PtMn layer has a thickness of  
2 approximately 120  $\text{\AA}$ .

1 27. A hard disk drive as described in claim 23 wherein said Si seed sublayer is fabricated to  
2 have a thickness of approximately 20 Å and said PtMn layer has a thickness of approximately  
3 120 Å.

1 28. A hard disk drive as described in claim 27 wherein said spin valve sensor layers include  
2 at least one pinned magnetic layer having a composition including CoFe and at least one spacer  
3 layer having a composition including Cu, and at least one free magnetic layer having a  
4 composition including Co or CoFe.

5 29. A method for fabricating a magnetic head including a spin valve sensor, comprising the  
6 steps of:

7 fabricating a first electrical insulation layer (G1) above a first magnetic shield layer (S1);

8 fabricating a plurality of spin valve sensor layers above said G1 layer, said spin valve  
9 sensor layers including a seed layer, a PtMn antiferromagnetic layer, at least one pinned  
10 magnetic layer and at least one free magnetic layer;

11 wherein said seed layer includes seed sublayers including  $\text{Al}_2\text{O}_3$ ,  $\text{NiMnO}$  and  $\text{Si}$ .

1 30. A method for fabricating a magnetic head as described in claim 29 wherein said Si seed  
2 sublayer is fabricated to have a thickness of approximately 10 to 40 Å.

1 31. A method for fabricating a magnetic head as described in claim 29 wherein said Si seed  
2 sublayer is fabricated to have a thickness of approximately 20 Å.

1 32. A method for fabricating a magnetic head as described in claim 30 wherein said PtMn  
2 layer has a thickness of approximately 120 Å.

1 33. A method for fabricating a magnetic head as described in claim 29 wherein said Si seed  
2 sublayer is fabricated to have a thickness of approximately 20 Å and said PtMn layer has a  
3 thickness of approximately 120 Å.

1 34. A method for fabricating a magnetic head as described in claim 33 wherein said spin  
2 valve sensor layers include at least one pinned magnetic layer having a composition including  
3 CoFe and at least one spacer layer having a composition including Cu, and at least one free  
4 magnetic layer having a composition including Co or CoFe.

1 35. A method for fabricating a magnetic head as described in claim 29 including the further  
2 step of etching a surface of said Si sublayer prior to the deposition of said PtMn layer thereon.

1 36. A method for fabricating a magnetic head including a spin valve sensor, comprising the  
2 steps of:

3 fabricating a first electrical insulation layer (G1) above a first magnetic shield layer (S1);  
4 fabricating a plurality of spin valve sensor layers above said G1 layer, said spin valve  
5 sensor layers including a seed layer, a PtMn antiferromagnetic layer, at least one pinned  
6 magnetic layer and at least one free magnetic layer;

7       wherein said seed layer is comprised of Al<sub>2</sub>O<sub>3</sub>, NiMnO, Si sublayers, and wherein said Si  
8       sublayer is fabricated by depositing it to a first thickness and subsequently etching it back to a  
9       final thickness before the fabrication of said PtMn layer.

1       37.    A method for fabricating a magnetic head as described in claim 36 wherein said Si  
2       sublayer is fabricated to have a final thickness of from approximately 10 Å to approximately 40  
3       Å.

1       38.    A method for fabricating a magnetic head as described in claim 37 wherein said Si  
2       sublayer is fabricated to have a final thickness of approximately 20 Å.

1       39.    A method for fabricating a magnetic head as described in claim 37 wherein said Si seed  
2       sublayer is fabricated to have a thickness of approximately 20 Å and said PtMn layer has a  
3       thickness of approximately 120 Å.

1       40.    A method for fabricating a magnetic head as described in claim 39 wherein said spin  
2       valve sensor layers include at least one pinned magnetic layer having a composition including  
3       CoFe and at least one spacer layer having a composition including Cu, and at least one free  
4       magnetic layer having a composition including Co or CoFe.